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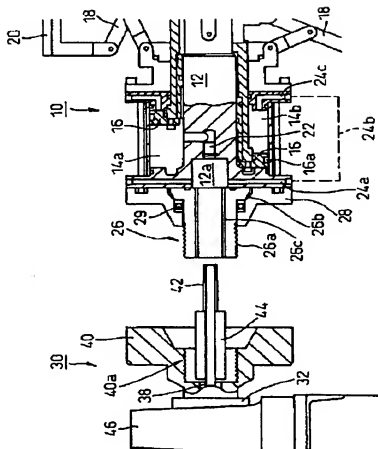
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TITLE : APPARATUS FOR ATTACHING AND  
DETACHING TIRE MOLDING DRUM

FIG. 3



**ABSTRACT :** PROBLEM TO BE SOLVED: To reduce labor or the number of processes required in the attachment and detachment of a tire molding drum and to eliminate the irregularity of clamping force to enhance concentricity, in a apparatus for attaching and detaching the tire molding drum with respect to a molding machine body, performing the expansion and contraction of the drum by a built-in air cylinder.

**SOLUTION:** The drum (10) is equipped with a screw member (26) held in a rotatable manner and air supply and discharge parts (22 and 24) for the air cylinder (14) and the molding machine body (30) is equipped with a main shaft (32) having a screw part capable of being threaded with the screw member, a pipe (42) rotatable independently of the main shaft, the air passage in the pipe, the annular air passage (38) between the outer periphery of the pipe and the inner wall of the main shaft and the spline part attached to the pipe and connectable to the screw member. At the time of mounting of the drum, the screw member is rotated by rotating the pipe to mount the drum on the molding machine body and air is supplied to and discharged from the air supply and discharge part through two air passages.

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**CLAIMS**

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**[Claim(s)]**

[Claim 1] It is equipment which detaches and attaches a tire shaping drum on the body of a making machine and which performs expanding and contracting of a drum by the air cylinder in which it was contained by this drum. Said drum The body of a drum, and the rotation member which was held pivotable to this body of a drum and which has the 1st thread part, The two air feeding-and-discarding sections for supplying or exhausting air to said air cylinder are provided. Said body of a making machine The main shaft which has the 2nd thread part which it is attached pivotable and can be screwed in said 1st thread part to a body frame, It becomes independent, respectively about the pipe attached in the interior of this main shaft pivotable, and said main shaft and pipe. The driving means which can be driven, The 1st air duct specified inside this pipe, and the 2nd annular air duct specified between the periphery of this pipe, and the wall of said main shaft, In case it is attached in this pipe, and the connection member which can be connected with said rotation member is provided and the body of a making machine is equipped with said drum, said connection member in the condition of having made it connecting with said rotation member It is at the completion time of making said rotation member rotate, having, making the 2nd thread part conclude said 1st thread part, and making said body of a making machine equip with said drum by rotating said pipe, and this wearing. Attachment-and-detachment equipment of the tire shaping drum characterized by connecting airtightly said 1st and 2nd air ducts to each of said two air feeding-and-discarding sections.

[Claim 2] Said rotation member is a \*\*\*\* member attached in this body of a drum, and this heart pivotable at the body of drum making machine attachment-side. By this \*\*\*\* member's having the male screw section as said 1st thread part on the periphery, and said main shaft's having the female screw section as said 2nd thread part to this main shaft and this heart at a drum attachment side, and screwing this male screw section in this female screw section, and on the other hand, being concluded Equipment according to claim 1 characterized by equipping said body of a making machine with said drum.

[Claim 3] Said connection member is equipment according to claim 1 or 2 which consists of the castellated-shaft section prepared in the periphery section of said pipe in one, and is characterized by having the spline hole with which said rotation member can fit into this castellated-shaft section on the other hand.

[Claim 4] It is equipment according to claim 3 which said spline section has two or more key seats of shaft orientations in the periphery section, and is characterized by this key seat being open for free passage to said 2nd air duct in the state of wearing of a drum.

[Claim 5] Said pipe is projected from said spline section to said body side of a drum. On the other hand, said body of a drum Said spline hole of said rotation member is adjoined, and it has opening. At the pars basilaris ossis occipitalis of this opening It has the vent of the shaft orientations which specify one side of said two air feeding-and-discarding sections. It has the radial vent which specifies another side of said two air feeding-and-discarding sections on the side face of this opening. Equipment according to claim 4 with which said 2nd air duct as which it is airtightly joined to opening of the vent of said shaft orientations, and the tip of said pipe is specified by the key seat of said spline section when the body of a making machine is equipped with a drum is characterized by being airtightly open for free passage to a vent radial [ said ].

[Claim 6] Equipment according to claim 1 characterized by connecting to said 1st and 2nd air ducts the air-supply-and-exhaust port which carried out mutually-independent through the rotary seal, respectively.

[Claim 7] Said main shaft and said pipe are equipment according to claim 1 characterized by a rotation drive being carried out by the independent drive system, respectively.

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

[Field of the Invention] This invention relates to the equipment which detaches and attaches a tire shaping drum on the main shaft of a tire making machine. Especially this invention relates to the attachment-and-detachment equipment of the tire shaping drum which is performing expanding and contracting of a drum by the air cylinder in which it was contained by the drum.

**[0002]**

[Description of the Prior Art] In order to equip the main shaft by the side of the body of a tire making machine with a tire shaping drum conventionally, after lifting a drum since the self-weight of a drum is quite large with a crane etc. and positioning it correctly on the main shaft of a tire making machine, it is concluded by the main shaft of a making machine with two or more mounting bolts. In this case, since a mounting bolt amounts to 6-10, attachment of a drum and the big force for demounting are needed, and that man day is also usually size. Moreover, the degree of the said heart between a main shaft and a drum falls by the variation in the conclusion force etc., and there are troubles, like there is a possibility of having a bad influence on the quality of the tire with which the deflection under rotation to the drum after wearing is fabricated by being generated.

[0003] Moreover, there is also a problem that the time amount which attachment and detachment of a drum take becomes long. Next, with reference to a drawing, the conventional example of the tire shaping drum attachment-and-detachment equipment of the format held by the air cylinder in which expanding and contracting of a drum were contained by the drum is explained with reference to drawing 1 and drawing 2. Drawing 1 is in the condition before drum wearing in the example of \*\*\*\*\*, and while some drums are omitted and shown, the body side of a tire making machine shows only a drum wearing part. Drawing 2 is in the condition after drum wearing in the example of \*\*\*\*\*, a drum shows the whole abbreviation configuration and the body side of a making machine shows only the circumference of the applied part of a drum.

[0004] In these drawings, the tire shaping drum 10 has a medial axis 12, and the annular cylinders 14a and 14b are formed in the perimeter. Fitting of the ring-like piston 16 is carried out to these cylinders 14a and 14b through O ring 16a. And the extension of a piston 16 is connected with a link 18, and carries out the operation which expands and contracts the drum flange 20 to radial. In addition, it is shown that it is in the diameter-reduction condition which the piston 16 carried out slide migration of the method 30 of right, i.e., body of making machine, side to the opposite side as for the upper half of the tire shaping drum 10, and made the path of the drum flange 20 the smallest, and it is shown in drawing 1 and drawing 2 that the lower half of a tire shaping drum 10 is in the diameter-expansion condition to which the piston 16 carried out [ condition ] slide migration to the left, i.e., the body 30 side of a making machine, and enlarged the path of the drum flange 20 most.

[0005] Piping which supplies actuation air becomes Cylinders 14a and 14b from two lines. The vent 22 which is one piping was formed along with the left end section of the medial axis 12 of a drum 10, i.e., the medial-axis line of opening hole 12a prepared so that opening might be carried out to the body 30 side of a making machine, is prolonged in radial from the middle of the part which met the medial-axis line, and is opening this vent 22 for free passage to chamber 14a on the left-hand side of a cylinder. Moreover, piping of another side is open for free passage through vent 24a prepared in radial [ the ], piping 24b (a broken line shows) which is open for free passage to this, and vent 24c to

chamber 14b on the right-hand side of a cylinder from the wall section of opening hole 12a of the medial axis 12 of a drum 10.

[0006] The body 30 side of a tire molding machine has the mounting-flange section 34 formed in the edge by the side of drum anchoring of a main shaft 32 at this main shaft 32 and one, and this mounting-flange section 34 is equipped with the tire shaping drum 10 removable. Piping which also becomes a main shaft 32 from two lines is prepared. One piping (inside piping) consists of a pipe 36 prepared along with the medial axis of a main shaft 32, and piping (outside piping) of another side consists of the periphery section of this pipe 36, a feed hole of a main shaft 32, and an annular air duct 38 formed in between. Partial 34a around the annular path 38 which is outside piping is projected from the end face (drum clamp face) of the drum mounting flange 34 to the drum 10 side, and the pipe 36 which is inside piping is further projected from this partial 34a to the drum 10 side.

[0007] In order to equip the main shaft 32 of the body 30 of a making machine with the tire shaping drum 10, a drum 10 is moved to the main shaft 30 side by the side of the body of a making machine in the state of suspension with a crane etc. (not shown). In this case, while making alignment the hand of cut of a drum 10 and a main shaft 32 by rotating the main shaft 32 of the body 30 of a making machine it considers as the condition which shows a drum 10 in drawing 2, doubling a location so that opening hole 12a of the medial axis 12 of a drum 10 may hear about perimeter section 34a at the right end of the outside piping 38 of the body 30 of a making machine, and the main vent 22 of a drum 10 may hear about the tip of the pipe 36 of the body 30 of a making machine further. At this time, the tip of a pipe 36 fits into opening of a vent 22, and perimeter section 34a of the outside piping 38 fits into opening hole 12a.

[0008] Next, although not shown in a detail at drawing 1 and drawing 2, the main shaft 32 of the tire making machine 30 is equipped with a drum 10 with a perimeter 6 thru/or about ten bolts (not shown) between the mounting-flange section 34 of a main shaft 32, and the main shaft attachment side edge surface part of a drum. In that case, with a suitable seal, a pipe 36 is airtightly connected with a vent 22, and the outside piping 38 is airtightly opened for free passage by opening hole 12a. Thereby, the pipe 36 which is inside piping is open for free passage through a vent 22 to chamber 14a on the left-hand side of a cylinder, and opens the outside piping 38 for free passage to right-hand side chamber 14b of a cylinder through opening hole 12a, vent 24a, piping 24b, and vent 24c.

[0009] Therefore, by supplying air to a drum 10 side from a pipe 36 after wearing of a drum 10, passing to the outside piping 38 conversely, and exhausting to the body 30 side of a making machine The piston 16 of a drum 10 by moving the inside of a cylinder to the method of the right, and the diameter reduction direction operating the drum flange 20, and supplying air to a drum 10 side from the outside piping 38 side conversely, and exhausting to the body 30 side of a making machine through a pipe 36 the piston 16 of a drum 10 -- a left -- moving -- the drum flange 20 -- the diameter expansion direction -- operating .

[0010]

[Problem(s) to be Solved by the Invention] According to the attachment-and-detachment equipment of the above-mentioned conventional tire shaping drum, as mentioned above, in order to have to conclude a drum 10 on the main shaft 32 of the body 30 of a tire making machine using two or more mounting bolts (not shown), attachment of a drum and the big force for demounting are needed, and the man day is also size. Moreover, the degree of the said heart falls by the variation in the conclusion force etc., and there are problems, such as having a bad influence on the quality of the tire with which the deflection under rotation to a shaping drum is fabricated by being generated.

[0011] Then, this invention makes it a technical problem to offer the attachment-and-detachment equipment of the tire shaping drum which solved the above problems in the tire making machine which is performing drum expanding and contracting by the air cylinder in which it was contained by the drum.

[0012]

[Means for Solving the Problem] In order to attain the above-mentioned technical problem, according to this invention, it is equipment which detaches and attaches a tire shaping drum on the body of a making machine and which performs expanding and contracting of a drum by the air cylinder in which it was contained by this drum. Said drum The body of a drum, The rotation member which was held pivotable to this body of a drum and which has the 1st thread part, The two

air feeding-and-discarding sections for supplying or exhausting air to said air cylinder are provided. Said body of a making machine The main shaft which has the 2nd thread part which it is attached pivotable and can be screwed in said 1st thread part to a body frame, It becomes independent, respectively about the pipe attached in the interior of this main shaft pivotable, and said main shaft and pipe. The driving means in which a rotation drive is possible, The 1st air duct specified inside this pipe, and the 2nd annular air duct specified between the periphery of this pipe, and the wall of said main shaft, In case it is attached in this pipe, and the connection member which can be connected with said rotation member is provided and the body of a making machine is equipped with said drum, said connection member in the condition of having made it connecting with said rotation member It is at the completion time of making said rotation member rotate, having, making the 2nd thread part conclude said 1st thread part, and making said body of a making machine equip with said drum by rotating said pipe, and this wearing. The attachment-and-detachment equipment of the tire shaping drum characterized by connecting airtightly said 1st and 2nd air ducts to each of said two air feeding-and-discarding sections is offered.

[0013] Said rotation member is a \*\*\*\* member attached in this body of a drum, and this heart pivotable at the body of drum making machine attachment-side. By this \*\*\*\* member's having the male screw section as said 1st thread part on the periphery, and said main shaft's having the female screw section as said 2nd thread part to this main shaft and this heart at a drum attachment side, and screwing this male screw section in this female screw section, and on the other hand, being concluded It is characterized by equipping said body of a making machine with said drum.

[0014] Said connection member consists of the spline section prepared in the periphery section of said pipe in one, and, on the other hand, said rotation member is characterized by having the spline hole which can fit into this spline section. Said spline section has two or more key seats of shaft orientations in the periphery section, and this key seat is characterized by being open for free passage to said 2nd air duct in the state of wearing of a drum.

[0015] Said pipe is projected from said spline section to said body side of a drum. On the other hand, said body of a drum Said spline hole of said rotation member is adjoined, and it has opening. At the pars basilaris ossis occipitalis of this opening It has the vent of the shaft orientations which specify one side of said two air feeding-and-discarding sections. It has the radial vent which specifies another side of said two air feeding-and-discarding sections on the side face of this opening. When the body of a making machine is equipped with a drum, the tip of said pipe is airtightly joined to opening of the vent of said shaft orientations, and said 2nd air duct specified by the key seat of said spline section is characterized by a vent radial [ said ] being airtightly open for free passage.

[0016] It is characterized by connecting to said 1st and 2nd air ducts the air-supply-and-exhaust port which carried out mutually-independent through the rotary seal, respectively. It is characterized by the rotation drive of said main shaft and said pipe being carried out by the independent drive system, respectively.

[0017]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained to a detail with reference to an accompanying drawing. Drawing 3 - drawing 5 show 1 operation gestalt of the tire shaping drum attachment-and-detachment equipment of the format that the air cylinder in which it was contained by the drum performs expanding and contracting of a drum of this invention. Drawing 3 is in the condition before drum wearing of this invention equipment, and while some drums are omitted and shown, the body side of a tire making machine shows only a drum wearing part. Drawing 4 shows the actuation under drum wearing in this invention equipment, and drawing 5 shows the condition of performing expanding-and-contracting actuation of a drum after drum wearing in this invention equipment. In these drawings, a drum omits and shows the part and the body side of a making machine shows only the circumference of the applied part of a drum.

[0018] The tire shaping drum 10 has a medial axis 12, and the annular cylinders 14a and 14b are formed in the perimeter. Fitting of the ring-like piston 16 is carried out to these cylinders 14a and 14b. And the extension of a piston 16 is connected with a link 18, and carries out the operation which expands and contracts the drum flange 20 to radial. In addition, it is shown that it is in the diameter-reduction condition which the piston 16 carried out slide migration of the method 30 of right, i.e., body of making machine, side to the opposite side as for the upper half of the tire shaping

drum 10, and made the path of the drum flange 20 the smallest, and it is shown in drawing 3 - drawing 5 that the lower half of a tire shaping drum 10 is in the diameter-expansion condition to which the piston 16 carried out [ condition ] slide migration to the left, i.e., the body 30 side of a making machine, and enlarged the path of the drum flange 20 most.

[0019] Piping which supplies actuation air becomes Cylinders 14a and 14b from two lines. The vent 22 which is one piping was formed along with the left end section of the medial axis 12 of a drum 10, i.e., the medial-axis line of opening hole 12a prepared so that opening might be carried out to the body 30 side of a making machine, is prolonged in radial from the middle of the part which met the medial-axis line, and is opening this vent 22 for free passage to chamber 14a on the left-hand side of a cylinder. Moreover, piping of another side is open for free passage through vent 24a prepared in radial [ the ], piping 24b (a broken line shows) which is open for free passage to this, and vent 24c to chamber 14b on the right-hand side of a cylinder from the wall section of opening hole 12a of the medial axis 12 of a drum 10.

[0020] The body 30 side of a tire molding machine has the mounting-flange section 34 formed in the edge by the side of drum anchoring of a main shaft 32 at this main shaft 32 and one, and this mounting-flange section 34 is equipped with the tire shaping drum 10 removable. Piping which also becomes a main shaft 32 from two lines is prepared. One piping (inside piping) consists of a pipe 36 prepared along with the medial axis of a main shaft 32, and piping of another side consists of the periphery section of this pipe 36, a feed hole of a main shaft 32, and an annular air duct 38 formed in between. Partial 34a around the annular path 38 which is outside piping is projected from the end face (drum clamp face) of the drum mounting flange 34 to the drum 10 side, and the pipe 36 which is inside piping is further projected from this partial 34a to the drum 10 side. The tip of a pipe 36 has the dimension which can fit into opening of a vent 22, and perimeter section 34a of the outside piping 38 has the dimension which can fit into opening hole 12a. The suitable seal for between a pipe 36 and vents 22 and between the outside piping 38 and opening hole 12a to be open for free passage to an airtight, respectively is prepared.

[0021] The configuration explained above is the same as that of the above-mentioned conventional example shown in drawing 1 and drawing 2. However, with the operation gestalt of this invention, the point of having attached in the drum 10 side the stay 28 which holds the \*\*\*\* member 26 and this screw-thread member 26 pivotable is different from the conventional example. Moreover, the point that the screw-thread member 26 by the side of a drum 10, the nut section 40 which fits in, and the main shaft 32 for rotating this screw-thread member formed the pivotable pipe 42 independently at the main shaft 32 side of the body 30 of a making machine is different.

[0022] Next, the structure of the tire shaping drum 10 in the operation gestalt of this invention is explained to a detail. Along with the same axis as a drum 10, the \*\*\*\* member 26 is formed in the end face by the side of the body 30 of a making machine of the medial axis 12 of a drum 10 pivotable. Pore 26c by which a path is large, and base 26b for holding pivotable was formed in one, penetrated this member itself to shaft orientations inside, and this screw-thread member 26 formed the spline in inner circumference from male screw section 26a with which \*\*\*\* is cut by the periphery, and this male screw section 26a is prepared.

[0023] The stay member 28 for attaching the screw-thread member 26 of such a configuration in a drum 10 pivotable is fixed to the end face by the side of the body 30 of a making machine of the medial axis 12 of a drum 10 with two or more screw threads in the perimeter section. And this stay member 28 is \*\*\*\*ed by the built-in bearing 29, and it supports a member 26 so that it may become pivotable as a core about the medial-axis line of a drum 10. At this time, male screw section 26a of the \*\*\*\* member 26 is projected from the stay member 28 to the body 30 side of a making machine, and base 26b becomes the gestalt held inside the stay member 28. Moreover, base 26a touches the end face of a medial axis 12 through a seal, and spline hole 26c of the \*\*\*\* member 26 is in the condition that it was airtightly open for free passage to opening hole 12a by the side of the body 30 of a making machine of a medial axis 12.

[0024] Next, the structure by the side of the body 30 of a making machine in the operation gestalt of this invention is explained to a detail. The nut section 40 is formed in [ the main shaft 32 of the body 30 of a making machine / the edge by the side of that drum 10 / as this main shaft 10 ] one. Male screw 26a of the screw-thread member 26 by the side of a drum 10 and female screw 40a which can

be fitted in are formed in the opening part of the feed hole which carried out opening to the drum 10 side of this nut section 40.

[0025] The pipe [ this main shaft 32 ] 42 which can be rotated independently is formed in the interior of the feed hole of a main shaft 32. The point by the side of the drum 10 of this HAIPU 42 is projected to the drum 10 side from the end face by the side of the drum 10 of the nut section 40 of a main shaft 32, and the castellated-shaft section 44 which can fit into spline hole 26c of the screw-thread member 26 by the side of a drum 10 is formed in the location drawn from this point in one with this pipe 42. Mutually-independent [ of a main shaft 32 and the pipe 42 ] is carried out with the drive mentioned later, respectively, and a rotation drive is carried out. Key-seat 44a of the shaft orientations for making the castellated-shaft section 44 pass air, as shown in drawing 6 is formed in four perimeters at equal intervals.

[0026] In order to equip the main shaft 32 of the body 30 of a making machine with the tire shaping drum 10, a drum 10 is moved to the main shaft 32 side by the side of the body of a making machine in the state of suspension with a crane etc. (not shown). In this case, as shown in drawing 3 , it lets spline hole 26c of the screw-thread member 26 of a drum 10 pass to the point of a pipe 42.

Subsequently, as shown in drawing 4 , fitting of the spline hole 26c of the screw-thread member 26 of a drum 10 is carried out to the castellated-shaft section 44 of a pipe 42, and it is pushed in further.

[0027] Only a pipe 42 is rotated when the part of male screw 26a of the screw-thread member 26 by the side of a drum 10 reaches opening of female screw 40a of the nut section 40 by the side of the body 30 of a making machine. The \*\*\*\* member 26 is rotated by the castellated-shaft section's 44 \*\*\*\*\* and having fitted into spline hole 26c of a member 26 by rotation of a pipe 42. At this time, a rotation drive is not carried out but the main shaft 32 is in the condition that the stopper (not shown) was covered so that rotation might be prevented rather.

[0028] When the screw-thread member 26 rotates, male screw 26a of this screw-thread member 26 will be thrust into female screw 40a of the nut section 40, and a drum 10 will move to the body 30 side of a making machine gradually by this. Soon, as shown in drawing 5 , it will be in the condition that male screw 26a of the \*\*\*\* member 26 was completely concluded by female screw 40a of the nut section 40, and the conclusion to the body 30 of a making machine of a drum 10 will be completed.

[0029] In addition, although positioning of the hoop direction to the main shaft 32 of the body 30 of a making machine of a drum 10 is not illustrated, two or more taper pins etc. can perform it. Such a taper pin prepares two or more taper pins with which the tip which projects in shaft orientations at a drum 10 side sharpened in the end face of the nut section 40 of a main shaft 32. On the other hand, the taper hole of shaft orientations is prepared in the end face of the nut section 40 at the end face of the stay 28 of the drum 10 which carries out field contact corresponding to said taper pin. In case the body 30 of a making machine is equipped with a drum 10, the hoop direction of a drum 10 can be positioned by guiding a drum 10 so that a predetermined taper pin may be inserted in a taper hole.

[0030] After the screw-thread member 26 has been completely concluded by female screw 40a of the nut section 40, the tip by the side of the drum 10 of a pipe 42 fits into opening of a vent 22 airtightly. Moreover, the nut section 40 of a main shaft 32 will be in the condition of having stuck to the stay 28 by the side of a drum 10. In that case, the inside of the pipe 42 which is the 1st piping is airtightly connected with a vent 22 with a suitable seal, and the annular path 38 of the outside of the pipe 42 which is the 2nd piping is airtightly opened for free passage by opening hole 12a of the medial axis 12 of a drum 10 through key-seat 44a of the castellated-shaft section 44.

[0031] The inside of the pipe 42 which is the 1st piping is open for free passage through the vent 22 of a drum 10 by this to chamber 14a on the left-hand side of a cylinder. The annular path 38 between the feed holes of a main shaft 32 and the peripheries of a pipe 42 which are the 2nd piping will be opened for free passage by right-hand side chamber 14b of a cylinder through key-seat 44a of the castellated-shaft section 44, opening hole 12a of a drum 10, vent 24a, piping 24b, and vent 24c.

[0032] Therefore, by after wearing of a drum 10 supplying air to a drum 10 side from the inside of a pipe 42, and passing and exhausting to the annular path 38 of the outside of a pipe 42 conversely The piston 16 of a drum 10 moves the inside of a cylinder to the method of the right, and the diameter reduction direction operates the drum flange 20 by the link mechanism 18. On the contrary, by supplying air to a drum 10 side from the annular path 38 of the periphery of a pipe 42, and



exhausting to the inside of a pipe 32, the piston 16 of a drum 10 moves to a left, and operates the drum flange 20 in the diameter expansion direction by the link mechanism 18.

[0033] Drawing 7 shows the whole tire making machine structure in the condition of having equipped with the tire formation drum, and drawing 8 expands and shows the part of A of drawing 7. As mentioned above, the pipe 42 which constitutes an inner shaft is arranged so that it can rotate independently in this main shaft 32 inside the feed hole of a main shaft 32. And the inside of this pipe 42 constitutes the 1st piping, and the annular path 38 between the feed hole of a main shaft 32 and the periphery of a pipe 42 constitutes the 2nd piping.

[0034] Bearing of the main shaft 32 is carried out to frame 30a of the body 30 of a making machine by bearing 46 pivotable, and a rotation drive is carried out by the motor 50 through a timing belt 48. the bearing (not shown) in which the inner shaft pipe 42 was formed in the interior of the feed hole of a main shaft 32 and in which air circulation is possible -- independence -- while bearing is carried out pivotable, in a drum 10, bearing of the pipe part into which the opposite side projected is carried out to frame 30a of the body 30 of a making machine by bearing 52 pivotable, and a rotation drive is carried out by the motor 57 through a sprocket 54, a chain 55, and an air clutch 56.

[0035] The supply of air to the interior of the pipe 42 which is the 1st piping It is carried out by the air-supply-and-exhaust port 60 connected to the edge of a pipe 42 through the rotary seal 58. Supply of air to the annular path 38 between the feed holes of a main shaft 32 and the peripheries of a pipe 42 which are the 2nd piping It is carried out by the air-supply-and-exhaust port 64 connected to the main shaft 32 through the rotary seal 63 prepared in the vent 61 formed in radial, the air slot 62 on the circumferential direction, and the periphery section of a main shaft 32. In addition, 65 is an O ring for carrying out the seal of the part into which a pipe 42 projects from a main shaft 32, i.e., the edge of the annular path 38.

[0036] As mentioned above, although the operation gestalt of this invention was explained to the detail with reference to the accompanying drawing, this invention is not limited to the above-mentioned operation gestalt, and it should care about that various gestalten, deformation, correction, etc. are possible to the pneuma of this invention thru/or within the limits.

[0037] [Effect of the Invention] Since according to this invention which was explained above the body of a drum is concluded with one nut to the body of a making machine and bolting torque on the periphery of a drum can be made uniform compared with the case where can decrease the effort and man day at the time of anchoring, and it concludes with two or more bolts, the degree of the said heart to the main shaft of the body of a making machine of a drum can be raised. Moreover, since it becomes possible by rotation of the same pipe about conclusion of a drum, and connection of an air network, it becomes the improvement in workability, and compaction of drum swap time. Moreover, in order that the mark of components (bolt etc.) required for drum attachment and detachment may decrease, the possibility of the components loss at the time of drum exchange decreases. Moreover, since conclusion of a drum was enabled with the nut which operates by rotation of a pipe in this way, the correspondence to automation of drum exchange becomes easy.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] The condition before drum wearing of conventional tire shaping drum attachment-and-detachment equipment is shown.

[Drawing 2] The condition after drum wearing in the conventional example of drawing 1 is shown.

[Drawing 3] The condition before drum wearing of the attachment-and-detachment equipment of the tire shaping drum of this invention is shown.

[Drawing 4] The condition under drum wearing of the tire shaping drum attachment-and-detachment equipment of drawing 3 is shown.

[Drawing 5] The condition after drum wearing of the tire shaping drum attachment-and-detachment equipment of drawing 3 is shown.

[Drawing 6] A sectional view shows the spline section.

[Drawing 7] It is drawing showing the whole tire making machine configuration equipped with the drum of this invention.

[Drawing 8] It is the enlarged drawing of the part of A of drawing 7.

[Description of Notations]

10 -- Tire formation drum

26 -- \*\*\* member

26a -- Male screw

26c -- Spline

28 -- Stay

30 -- Body of a tire making machine

32 -- Main shaft

38 -- Annular path

40 -- Nut section

40a -- Female screw

42 -- Pipe

44 -- Spline section

44a -- Key seat

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[Translation done.]

**\* NOTICES \***

**JPO and INPIT are not responsible for any damages caused by the use of this translation.**

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

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**DRAWINGS**

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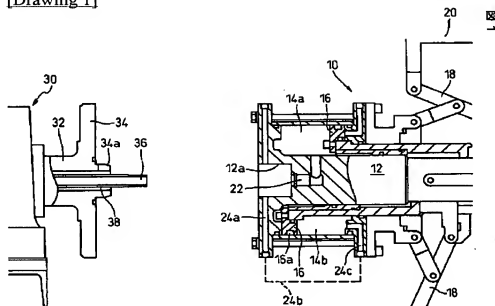
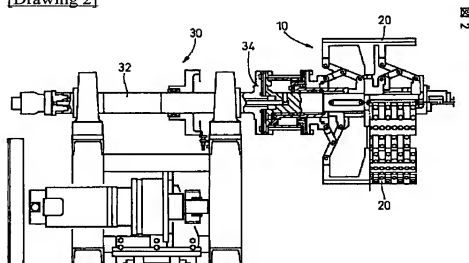
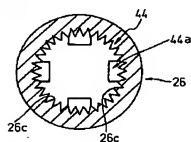
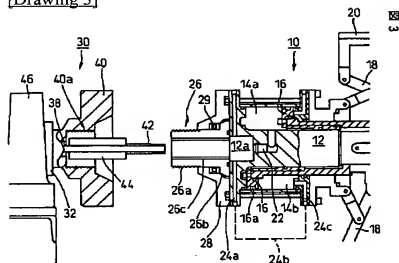
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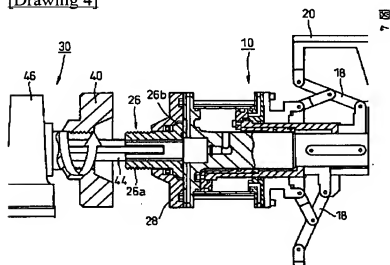
図 6



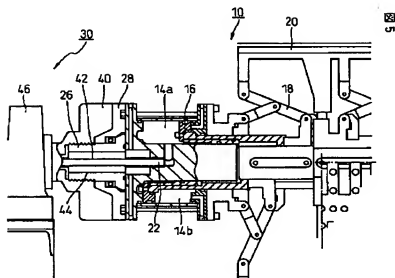
[Drawing 3]



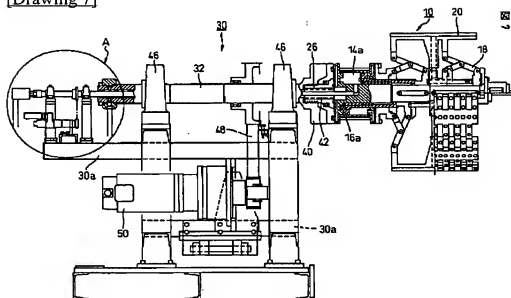
[Drawing 4]



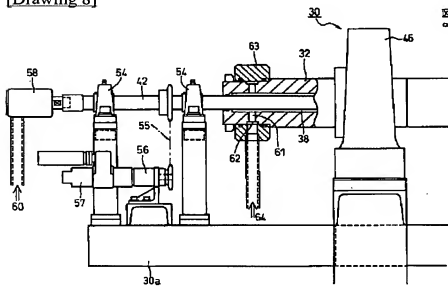
[Drawing 5]



[Drawing 7]



[Drawing 8]



[Translation done.]

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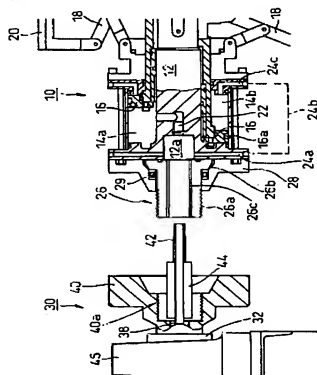
(54) 【発明の名称】 タイヤ成形ドラムの着脱装置

(57) 【要約】

【課題】 ドラムの拡張を内蔵のエアシリンダにより行う、タイヤ成形ドラムを成形機本体に着脱する装置において、ドラムの取付、取外しに要する労力や工数を軽減し、締結力のバラツキ等をなくして同芯度を高める。

【解決手段】 ドラム (10) は、回転可能に保持されたねじ部材 (26) と、エアシリンダ (14) 用のエア給排部 (32、24) と、を具備し、成形機本体 (30) は、ねじ部材に螺合可能なねじ部を有する主軸 (32) と、主軸とは独立して回転可能なパイプ (42) と、パイプ内側の空気通路と、パイプの外周と主軸の内壁との間の環状空気通路 (38) と、パイプに取付けられ且つねじ部材に対して連結可能なスプライン部とを具備し、ドラム装着する際、パイプを回転することによりねじ部材を回転せしめ、ドラムを成形機本体へ装着させ、かつ2つの空気通路を介してエア給排部にエアを給排する。

図 3



## 【請求項の範囲】

【請求項1】 ドラムの拡張を該ドラムに内蔵されたエアシリンダにより行う、タイヤ成形ドラムを成形機本体に装着する装置であって、

前記ドラムは、ドラム本体と、該ドラム本体に対して回転可能に保持された、第1のねじ部を有する回転部材と、前記エアシリンダに対して空気を供給又は排気するための2つのエア給排部と、を具備し、

前記成形機本体は、本体フレームに対して回転可能に取付けられ且つ前記第1のねじ部に螺合可能な第2のねじ部を有する主軸と、該主軸の内部に回転可能に取付けられたパイプと、前記主軸及びパイプをそれぞれ独立して駆動可能な駆動手段と、該パイプの内側に規定される第1の空気通路と、該パイプの外周と前記主軸の内壁との間に規定される環状の第2の空気通路と、該パイプに取付けられ且つ前記回転部材に連結可能な連結部材と、を具備し、

前記ドラムを成形機本体に装着する際、前記連結部材を前記回転部材に連結させた状態で、前記パイプを回転することにより前記回転部材を回転せしめ、もって、前記第1のねじ部を第2のねじ部に締結させて前記ドラムを前記成形機本体に装着させること、該装着の完了時点で、前記第1及び第2の空気通路が前記2つのエア給排部のそれぞれに気密に接続されることを特徴とするタイヤ成形ドラムの着脱装置。

【請求項2】 前記回転部材は、ドラム本体の成形機取付側に該ドラム本体と同芯に回転可能に取付けられたねじ部材であり、該ねじ部材はその外周に前記第1のねじ部としての雄ねじ部を有し、一方、前記主軸はドラム取付側に該主軸と同芯に前記第2のねじ部としての雌ねじ部を有し、該雄ねじ部が該雌ねじ部に螺合されて締結されることにより、前記ドラムが前記成形機本体に装着されることを特徴とする請求項1に記載の装置。

【請求項3】 前記連結部材は、前記パイプの外周部に一体的に設けられたスプライン軸部からなり、一方、前記回転部材は該スプライン軸部に嵌合可能なスプライン孔を有することを特徴とする請求項1又は2に記載の装置。

【請求項4】 前記スプライン部は、その外周部に軸方向の複数のキー溝を有し、該キー溝はドラムの装着状態で前記第2の空気通路に連通することを特徴とする請求項3に記載の装置。

【請求項5】 前記パイプは、前記スプライン部から前記ドラム本体側に突出しており、一方、前記ドラム本体は、前記回転部材の前記スプライン孔に隣接して開口部を有し、該開口部の底部に、前記2つのエア給排部の内の一方を規定する軸方向の空気孔を有し、該開口部の側面に、前記2つのエア給排部の他方を規定する半径方向の空気孔を有し、ドラムが成形機本体に装着された際、前記パイプの先端が前記軸方向の空気孔の開口部に

気密に接合され、前記スプライン部のキー溝により規定される前記第2の空気通路が前記半径方向の空気孔に気密に連通されることを特徴とする請求項4に記載の装置。

【請求項6】 前記第1及び第2の空気通路には、それぞれロータリシールを介して互いに独立した給排気ポートが接続されていることを特徴とする請求項1に記載の装置。

【請求項7】 前記主軸及び前記パイプはそれぞれ独立した駆動系により回転駆動されることを特徴とする請求項1に記載の装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明はタイヤ成形ドラムをタイヤ成形機の主軸に着脱する装置に関する。特に、本発明は、ドラムの拡張をドラムに内蔵されたエアシリンダにより行なっているタイヤ成形ドラムの着脱装置に関する。

【0002】

【従来の技術】従来、タイヤ成形ドラムをタイヤ成形機本体側の主軸に装着するには、ドラムの自重がかなり大きいことから、ドラムをクレーン等で吊り上げて、タイヤ成形機の主軸に正確に位置決めしてから、複数の取付ボルトにより成形機の主軸に締結される。この場合において、通常、取付ボルトは6〜10本に達するため、ドラムの取付、取外しに大きな力を必要とし、またその工数も大である。また、締結力のバラツキ等により主軸とドラム間の同心度が低下し、装着後のドラムに回転中の振れが生じて成形されるタイヤの品質に悪影響を及ぼす恐れがある等の問題点がある。

【0003】また、ドラムの着脱に要する時間が長くなるという問題もある。次に図面を参照して、ドラムの拡張をドラムに内蔵されたエアシリンダにより行う形式のタイヤ成形ドラム着脱装置の従来例について図1及び図2を参照して説明する。図1は同従来例におけるドラム装着前の状態で、ドラムの一部を省略して示すと共に、タイヤ成形機の本体側はドラム装着部分のみを示す。図2は同従来例におけるドラム装着後の状態で、ドラムは略全体構成を示し、成形機本体側はドラムの装着部の周辺のみを示す。

【0004】これらの図において、タイヤ成形ドラム10は、中心軸12を有し、その周囲に環状のシリンダ14a、14bが形成されている。このシリンダ14a、14bにはオリング16aを介してリング状のピストン16が嵌合されている。そして、ピストン16の延長部分はリンク18に連結され、ドラムフランジ20を半径方向に拡張する作用をする。なお、図1及び図2において、タイヤ成形ドラム10の上半分はピストン16が右方へ、即ち成形機本体30側とは反対側へスライド移動して、ドラムフランジ20の径を最も小さくした縮径状

態であることを示し、タイヤ成形ドラム10の下半分はピストン16が左方へ、即ち成形機本体30側へスライド移動して、ドラムフランジ20の径を最も大きくした拡張状態であることを示す。

【0005】シリンダ14a、14bに作動エアを供給する配管は2系統からなる。一方の配管である空気孔22は、ドラム10の中心軸12の左端部、即ち成形機本体30側に開口するように設けられた開口孔12aの中心軸線に沿って設けられ、中心軸線に沿った部分の途中から半径方向に延びており、この空気孔22はシリンダの左側のチャンバ14aに連通している。また、他方の配管は、ドラム10の中心軸12の開口孔12aの内壁部からその半径方向に設けられた空気孔24aと、これに連通する配管24b（破線で示す）、空気孔24cを介してシリンダの右側のチャンバ14bに連通している。

【0006】タイヤ成形機本体30の間は、主軸32のドラム取付け側の端部に、この主軸32と一体に形成された取付フランジ部34があり、この取付フランジ部34にタイヤ成形ドラム10が着脱可能に装着される。主軸32にも、2系統からなる配管が設けられる。一方の配管（内側配管）は、主軸32の中心軸に沿って設けられたパイプ36からなり、他方の配管（外側配管）は、このパイプ36の外周部と主軸32の中心孔と間に形成された環状の空気通路38からなる。外側の配管である環状通路38の周囲の部分34aは、ドラム取付フランジ部34の端面（ドラム取付面）よりドラム10の側に突出しており、内側の配管であるパイプ36はこの部分34aから更にドラム10の側へ突出している。

【0007】タイヤ成形ドラム10を成形機本体30の主軸32に装着するには、ドラム10をクレーン等（図示せず）により吊り上げる状態で、成形機本体側の開口30側へ移動させる。この場合において、成形機本体30の主軸32を回転させることにより、ドラム10と主軸32との回転方向に位置合わせをすると共に、ドラム10の中心軸12の開口孔12aが成形機本体30の外側配管38の右端の周囲部34aを、何うように、更にドラム10の中心空気孔22が成形機本体30のパイプ36の先端を何うように位置を合わせながら、ドラム10を図2に示す状態とする。この時、パイプ36の先端は空気孔22の開口部に底合し、外側配管38の周囲部34aは開口孔12aに底合する。

【0008】次に、図1及び図2に詳細に示していないが、主軸32の取付フランジ部34とドラムの主軸取付側端面との間で、周囲6ないし10本程度のボルト（図示せず）によりドラム10をタイヤ成形機30の主軸32に装着する。その際、適切なシールにより、パイプ36は空気孔22に気密に連結され、外側配管38は開口孔12aに気密に連通される。これにより、内側配管であるパイプ36は空気孔22を経てシリンダの左側

のチャンバ14aに連通し、外側配管38は開口孔12a、空気孔24a、配管24b、空気孔24cを経てシリンダの右側チャンバ14bに連通する。

【0009】したがって、ドラム10の装着後、パイプ36からドラム10側へ空気を供給し、逆に外側配管38を経て成形機本体30の側に排気することにより、ドラム10のピストン16はシリンダ内を右方へ移動してドラムフランジ20を縮径方向の作動し、逆に、外側配管38の側からドラム10側へ空気を供給し、パイプ36を経て成形機本体30側へ排気することにより、ドラム10のピストン16は左方へ移動してドラムフランジ20を拡張方向の作動する。

【0010】

【発明が解決しようとする課題】 上述の従来のタイヤ成形ドラムの着脱装置によると、前述のように、被数個の取付ボルト（図示せず）を使用してドラム10をタイヤ成形機本体30の主軸32に締結しなければならないため、前述のように、ドラムの取付、取外しに大きな力を必要とし、またその工数も大である。また、締結力のバラツキ等により同心度が低下し、成形ドラムに回転中の振れが生じて成形されるタイヤの品質に悪影響を及ぼす等の問題がある。

【0011】そこで、本発明は、ドラム拡張をドラムに内蔵されたエアシリンダにより行なっているタイヤ成形機において、上述のような問題を解決した、タイヤ成形ドラムの着脱装置を提供することを課題とする。

【0012】

【課題を解決するための手段】 上記の課題を達成するために、本発明によれば、ドラムの拡張を該ドラムに内蔵されたエアシリンダにより行う、タイヤ成形ドラムを成形機本体に着脱する装置であって、前記ドラムは、ドラム本体と、該ドラム本体に対して回転可能に保持された、第1のねじ部を有する回転部材と、前記エアシリンダに対して空気を供給又は排気するための2つのエア給排部と、を具備し、前記成形機本体は、本体フレームに対して回転可能に取付けられ且つ前記第1のねじ部に螺合可能な第2のねじ部を有する主軸と、該主軸の内部に回転可能に取付けられたパイプと、前記主軸及びパイプをそれぞれ独立して回転駆動可能な駆動手段と、該パイプの内側に規定される第1の空気通路と、該パイプの外周と前記主軸の内壁との間に規定される環状の第2の空気通路と、該パイプに取付けられ且つ前記回転部材に連結可能な連結部材と、を具備し、前記ドラムを成形機本体に装着する際、前記連結部材を前記回転部材に連結させた状態で、前記パイプを回転することにより前記回転部材を回転させ、もって、前記第1のねじ部を第2のねじ部に締結させて前記ドラムを前記成形機本体に装着させること、該装着の完了時点で、前記第1及び第2の空気通路が前記2つのエア給排部のそれぞれに気密に接続されることを特徴とするタイヤ成形ドラムの着脱装置



が提供される。

【0013】前記回転部材は、ドラム本体の成形機取付側に該ドラム本体と同心に回転可能に取付けられたねじ部材であり、該ねじ部材はその外周に前記第1のねじ部としての雄ねじ部を有し、一方、前記主軸はドラム取付側に該主軸と同心に前記第2のねじ部としての雌ねじ部を有し、該雄ねじ部が雌ねじ部に螺合されて締結されることにより、前記ドラムが前記成形機本体に装着されることを特徴とする。

【0014】前記連結部材は、前記パイプの外周部に一体的に設けられたスプライン部からなり、一方、前記回転部材は該スプライン部に嵌合可能なスプライン孔を有することを特徴とする。前記スプライン部は、その外周面に軸方向の複数のキー溝を有し、該キー溝はドラムの装着状態で前記第2の空気通路に連通することを特徴とする。

【0015】前記パイプは、前記スプライン部から前記ドラム本体側に突出しており、一方、前記ドラム本体は、前記回転部材の前記スプライン孔に隣接して開口部を有し、該開口部の底部に、前記2つのエア給排部の内の一方向を規定する軸方向の空気孔を有し、該開口部の側面に、前記2つのエア給排部の内他方向を規定する半径方向の空気孔を有し、ドラムが成形機本体に装着された際、前記パイプの先端が前記軸方向の空気孔の開口部に気密に接合され、前記スプライン部のキー溝により規定される前記第2の空気通路が前記半径方向の空気孔に気密に連通することを特徴とする。

【0016】前記第1及び第2の空気通路には、それぞれロータリシールを介して互いに独立した給排気ポートが接続されていることを特徴とする。前記主軸及び前記パイプはそれぞれ独立した駆動系により回転駆動されることを特徴とする。

#### 【0017】

【発明の実施の形態】以下、添付図面を参照して本発明の実施の形態について詳細に説明する。図3～図5は本発明の、ドラムの拡張をドラムに内蔵されたエアシリンダにより行なう形式のタイヤ成形ドラム着脱装置の1実施形態を示す。図3は本発明装置のドラム装着前の状態で、ドラムの一部を省略して示すと共に、タイヤ成形機の本体側はドラム装着部分のみを示す。図4は同本発明装置におけるドラム装着後にドラムの拡張動作を行う状態を示す。これらの図において、ドラムはその一部を省略して示し、成形機本体側はドラムの装着部の周辺ののみを示す。

【0018】タイヤ成形ドラム10は、中心軸12を有し、その周囲に環状のシリンダ14a、14bが形成されている。このシリンダ14a、14bにはリング状のピストン16が嵌合されている。そして、ピストン16の延長部分はリンク18に連結され、ドラムフランジ2

0を半径方向に拡張する作用をする。なお、図3～図5において、タイヤ成形ドラム10の上半分はピストン16が右方へ、即ち成形機本体30側とは反対側へスライド移動して、ドラムフランジ20の径を最も小さくした縮径状態であることを示し、タイヤ成形ドラム10の下半分はピストン16が左方へ、即ち成形機本体30側へスライド移動して、ドラムフランジ20の径を最も大きくした拡張状態であることを示す。

【0019】シリンダ14a、14bに作動エアを供給する配管は2系統からなる。一方の配管である空気孔22は、ドラム10の中心軸12の左端部、即ち成形機本体30側に開口するように設けられた開口孔12aの中心軸線に沿って設けられ、中心軸線に沿った部分の途中から半径方向に延びており、この空気孔22はシリンダの左側のチャンバ14aに連通している。また、他方の配管は、ドラム10の中心軸12の開口孔12aの内壁部からその半径方向に設けられた空気孔24aと、これに連通する配管24b（破線で示す）、空気孔24cを介してシリンダの右側のチャンバ14bに連通している。

【0020】タイヤ成形機本体30の側は、主軸32のドラム取付け側の端部に、この主軸32と一体に形成された取付フランジ部34があり、この取付フランジ部34にタイヤ成形ドラム10が容易に装着される。主軸32にも、2系統からなる配管が設けられる。一方の配管（内側配管）は、主軸32の中心軸に沿って設けられたパイプ36からなり、他方の配管は、このパイプ36の外周部と主軸32の中心孔と間に形成された環状の空気通路38からなる。外側の配管である環状通路38の周囲の部分34aは、ドラム取付フランジ34の端面（ドラム取付面）よりドラム10の側へ突出しており、内側の配管であるパイプ36はこの部分34aから更にドラム10の側へ突出している。パイプ36の先端は空気孔22の開口部に嵌合可能な寸法を有し、外側配管38の周囲部分34aは開口孔12aに嵌合可能な寸法を有する。パイプ36と空気孔22との間、及び外側配管38と開口孔12aとの間がそれぞれ気密に連通するための適当なシールが設けられている。

【0021】以上に説明した構成は、図1及び図2に示した前述の従来例と同様である。しかしながら、本発明の実施形態では、ドラム10の側に、ねじ部材2と、このねじ部材26を回転可能に保持するステア28を取付けた点が、従来例と相違する。また、成形機本体30の主軸32の側に、ドラム10側のねじ部材26と嵌合するナット部40と、このねじ部材を回転させるための、主軸32とは独立して回転可能なパイプ42を設けた点が相違する。

【0022】次に、本発明の実施形態におけるタイヤ成形ドラム10の構造を詳細に説明する。ドラム10の中心軸12の成形機本体30側の端面には、ドラム10と

同じ軸芯に沿って回転可能にねじ部材26が設けられる。このねじ部材26は、外周にねじが切られている雄ねじ部材26aと、この雄ねじ部材26aより径が大きく且つこの部材自体を回転可能に保持するための基部26bとが一体に形成されたもので、内側には軸方向に貫通して内周にスプラインを形成した孔部26cが設けられる。

【0023】このような形状のねじ部材26をドラム10に回転可能に取付けるためのステーパー部材28は、その周囲部を複数のねじによりドラム10の中心軸12の成形機本体30側の端面に固定される。そして、このステーパー部材28は内蔵されたベアリング29によりねじ部材26をドラム10の中心軸線を中心として回転可能となるように支持する。このとき、ねじ部材26の雄ねじ部26aは、ステーパー部材28より成形機本体30の側面突出しており、基部26bはステーパー部材28の内部に保持された形態となる。また、基部26aはシールを介して中心軸12の端面に接離しており、ねじ部材26のスプライン孔26cは、中心軸12の成形機本体30側の開口12aに気密に連通した状態となっている。

【0024】次に、本発明の実施形態における成形機本体30側の構造を詳細に説明する。成形機本体30の主軸32は、そのドラム10側の端面に、この主軸10と一体的にナット部40が形成される。このナット部40のドラム10側に開口した中心孔の開口部分には、ドラム10側のねじ部材26の雄ねじ部26aと嵌合可能な雌ねじ部40aが形成される。

【0025】主軸32の中心孔の内部には、この主軸32とは独立して回転することが可能なパイプ42が設けられる。このパイプ42のドラム10側の先端部は、主軸32のナット部40のドラム10側の端面からドラム10側へ突出しており、この先端部から引き込んだ位置には、ドラム10側のねじ部材26のスプライン孔26cに嵌合可能なスプライン軸部44がこのパイプ42と一体的に形成されている。主軸32及びパイプ42は、それぞれ後述する駆動機構により互いに独立して回転駆動される。スプライン軸部44には、例えば図6に示すように、空気を通過させるための軸方向のキー溝44aが周囲4箇所等に間隔を形成されている。

【0026】タイヤ成形ドラム10を成形機本体30の主軸32に装着するには、ドラム10をクレーン等（図示せず）により吊り上げ、成形機本体側の主軸32側へ移動させる。この場合において、図3に示すように、ドラム10のねじ部材26のスプライン孔26cをパイプ42のスプライン軸部44に嵌合させて、更に押し込むようにする。

【0027】ドラム10側のねじ部材26の雄ねじ部26aの部分が成形機本体30側のナット部40の雌ねじ部

40aの開口部に達した時点で、パイプ42のみを回転させる。パイプ42の回転により、そのスプライン軸部44がねじ部材26のスプライン孔26cに嵌合していることにより、ねじ部材26を回転させる。この時、主軸32は回転駆動せず、むしろ回転を阻止するようにストッパ（図示せず）がかけられた状態となっている。

【0028】ねじ部材26が回転することにより、このねじ部材26の雄ねじ部26aがナット部40の雌ねじ部40aにねじ込まれ、これにより、ドラム10は徐々に成形機本体30側へ移動することとなる。やがて、図5に示すように、ねじ部材26の雄ねじ部26aがナット部40の雌ねじ部40aに完全に締結された状態となり、ドラム10の成形機本体30への締結が完了する。

【0029】なお、ドラム10の成形機本体30の主軸32に対する周方向の位置決めは、図示していないが、複数のテーパピン等により行うことができる。このようなテーパピンは、例えば主軸32のナット部40の端面にドラム10側に軸方向に突出する先端が尖った複数のテーパピンを設けておき、一方、ナット部40の端面に面接触するドラム10のステーパー部材28の端面に前記テーパピンに対応して軸方向のテーパ孔を設けておき、ドラム10を成形機本体30に装着する際に、所定のテーパピンが対応するテーパ孔に挿入されるようにドラム10を案内することでドラム10の周方向の位置決めを行うことができる。

【0030】ねじ部材26がナット部40の雌ねじ部40aに完全に締結された状態では、パイプ42のドラム10側の先端は、空気孔22の開口部に気密に嵌合する。また、主軸32のナット部40のドラム10側のステーパー部材28に対して密着した状態となる。その際、適切なシールにより、第1の配管であるパイプ42の内側は空気孔22に気密に連結され、第2の配管であるパイプ42の外側の環状通路38はスプライン軸部44のキー溝44aを経てドラム10の中心軸12の開口12aに気密に連通される。

【0031】これにより、第1の配管であるパイプ42の内側はドラム10の空気孔22を経てシリンダの左側のチャンバ14aに連通し、第2の配管である主軸32の中心孔とパイプ42の外周との間の環状通路38はスプライン軸部44のキー溝44a、ドラム10の開口12a、空気孔24a、配管24b、空気孔24cを経てシリンダの右側チャンバ14bに連通することとなる。

【0032】したがって、ドラム10の装着後は、パイプ42の内側からドラム10側へ空気を供給し、逆にパイプ42の外側の環状通路38を経て排気する方向へ移動し、ドラム10のピストン16はシリンダ内を右方へ移動してリンク機構18によりドラムフランジ20を縮径方向の作動し、逆に、パイプ42の外側の環状通路38からドラム10側へ空気を供給し、パイプ32の内側へ

排気することにより、ドラム10のピストン16は左方へ移動してリンク機構18によりドラムフランジ20を拡径方向に作動する。

【0033】図7はタイヤ形成ドラムを装着した状態のタイヤ成形機の全体構造を示し、図8は図7のAの部分の拡大して示す。前述のように、内軸を構成するパイプ42は主軸32の中心孔の内部にこの主軸32とは独立して回転できるように配置されている。そして、このパイプ42の内側が第1の配管を構成し、主軸32の中心孔とパイプ42の外周との間の環状通路38が第2の配管を構成する。

【0034】主軸32は軸受46により成形機本体30のフレーム30aに回転可能に支承され、タイミングベルト48を介してモータ50により回転駆動される。内軸パイプ42は、主軸32の中心孔の内部に設けられた空気流通可能な軸受(図示せず)にて、独立回転可能に支承されると共に、ドラム10とは反対側の突出したパイプ部分が軸受52により成形機本体30のフレーム30aに回転可能に支承され、スプロケット54、チェーン55、エアクラッチ56を介してモータ57により回転駆動される。

【0035】第1の配管であるパイプ42の内部への空気の供給は、パイプ42の端部にロータリシール58を介して接続された給排気ポート60により行われ、第2の配管である主軸32の中心孔とパイプ42の外周との間の環状通路38への空気の供給は、主軸32に半径方向に形成された空気孔61、円周方向の空気溝62、主軸32の外周部に設けられたロータリシール63を介して接続された給排気ポート64により行われる。なお、65はパイプ42が主軸32から突出する部分、即ち環状通路38の端部をシールするためのオリングである。

【0036】以上、添付図面を参照して本発明の実施形態について詳細に説明したが、本発明は上記の実施形態に限定されるものではなく、本発明の精神ないし範囲内において種々の形態、変形、修正等が可能であることに留意すべきである。

【0037】

【発明の効果】以上に説明したような、本発明によれば、ドラム本体は成形機本体に対して1つのナットにより締結されるので、取付け時の労力及び工数を減少させ

ることができ、また、複数のボルトで締結する場合と比べドラムの周上の締め付けトルクを均一とすることができ、ドラムの成形機本体の主軸に対する同心度を高めることができる。また、ドラムの締結及びエア系統の連結を同一パイプの回転により可能となるため作業性の向上及びドラム交換時間の短縮となる。また、ドラム着脱に必要な部品(ボルト等)の点数が減少するため、ドラム交換時の部品紛失の可能性が減少する。また、このようにパイプの回転により作動されるナットによりドラムの締結を可能としたので、ドラム交換の自動化への対応が容易となる。

【図面の簡単な説明】

【図1】従来のタイヤ成形ドラム着脱装置のドラム装着前の状態を示す。

【図2】図1の従来例におけるドラム装着後の状態を示す。

【図3】本発明のタイヤ成形ドラムの着脱装置のドラム装着前の状態を示す。

【図4】図3のタイヤ成形ドラム着脱装置のドラム装着中の状態を示す。

【図5】図3のタイヤ成形ドラム着脱装置のドラム装着後の状態を示す。

【図6】スプライン部を断面図で示す。

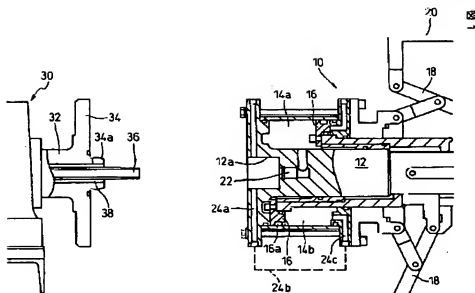
【図7】本発明のドラムを装着したタイヤ成形機の全体構成を示す図である。

【図8】図7のAの部分の拡大図である。

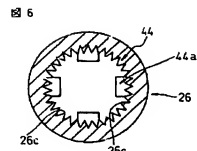
【符号の説明】

- 10…タイヤ形成ドラム
- 26…ねじ部材
- 26a…雄ねじ
- 26c…スプライン
- 28…ステア
- 30…タイヤ成形機本体
- 32…主軸
- 38…環状通路
- 40…ナット部
- 40a…雌ねじ
- 42…パイプ
- 44…スプライン部
- 44a…キー溝

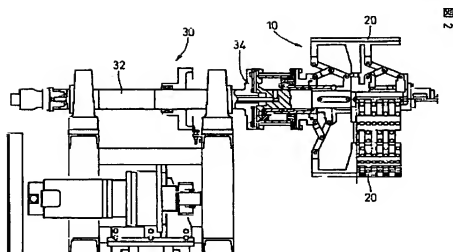
【図1】



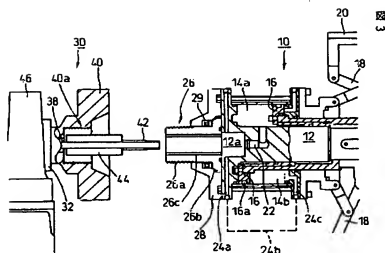
【図6】



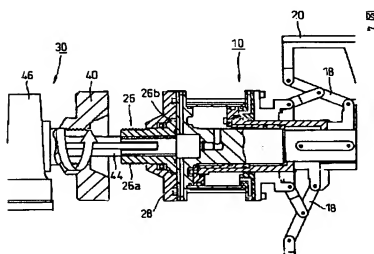
【図2】



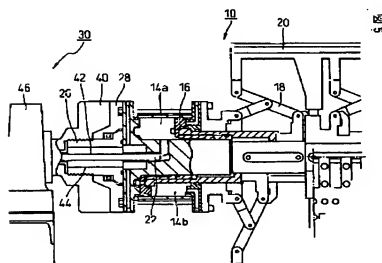
【図3】



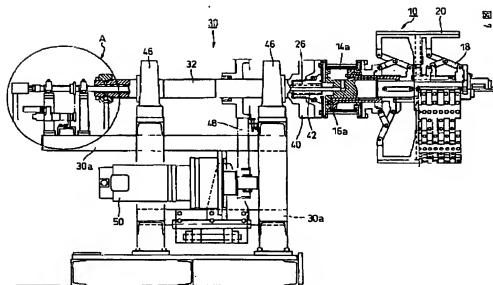
【図4】



【図5】



【図7】



【図8】

